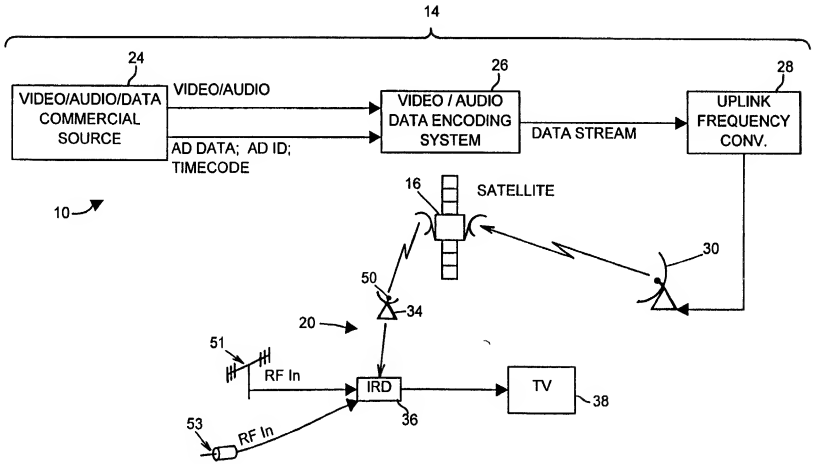

FIG. 1

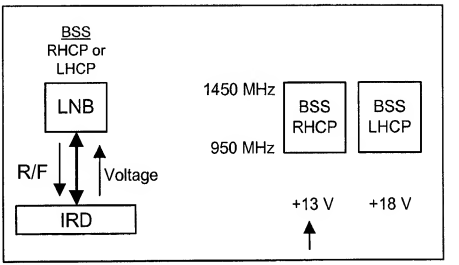

FIG. 2 PRIOR ART

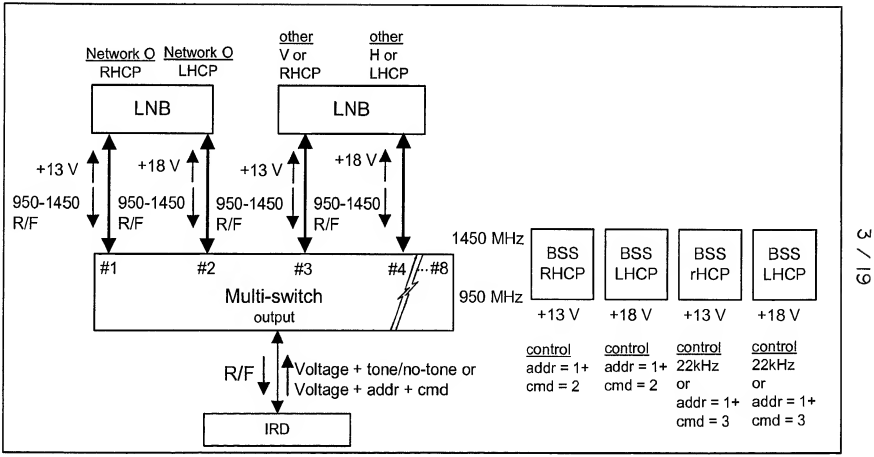

FIG. 3

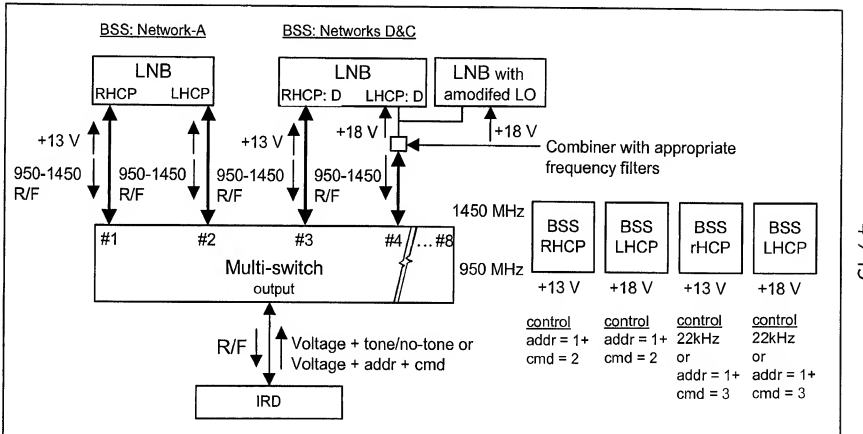

FIG. 4

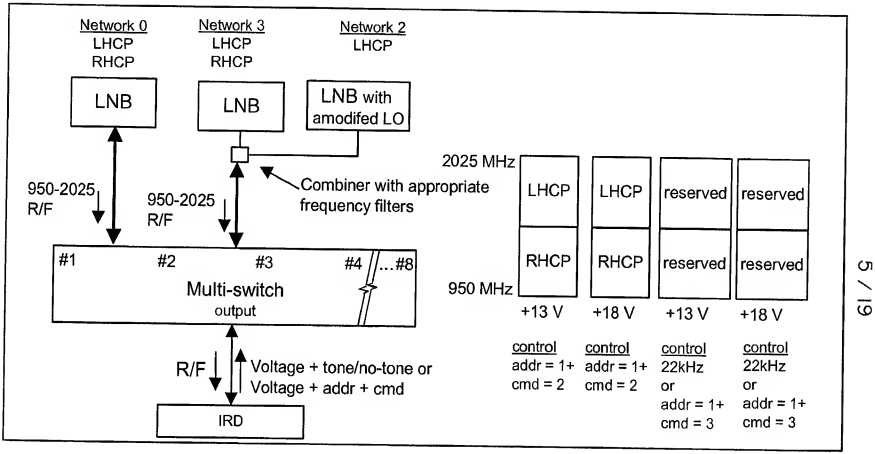

FIG. 5

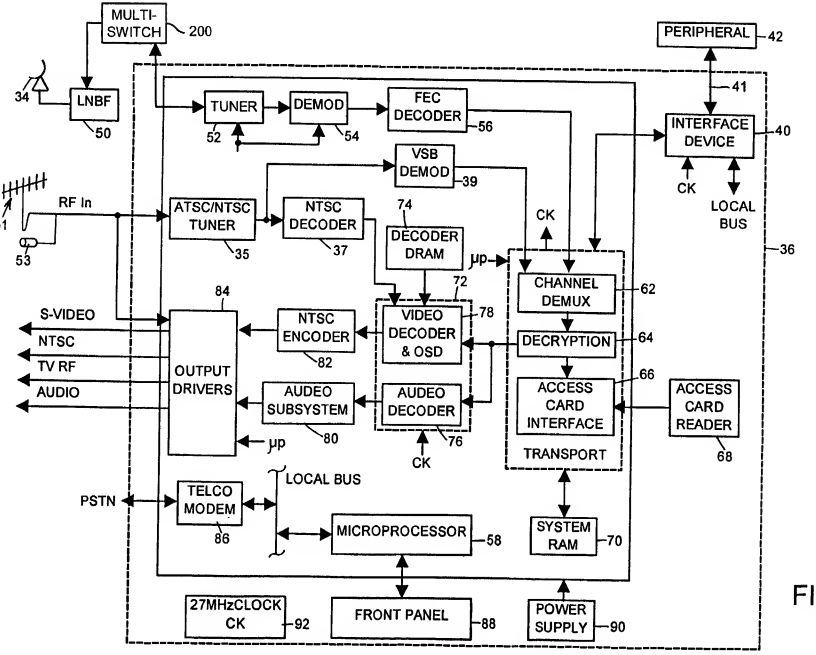
MULTI-SWITCH
200
PERIPHERAL
42
41
34
LNBF
50
TUNER
52
DEMOD
54
FEC DECODER
56
INTERFACE DEVICE
40
CK
LOCAL BUS
VSB DEMOD
39
RF In
51
53
ATSC/NTSC TUNER
35
NTSC DECODER
37
74
DECODER DRAM
CK
µp
36
72
CHANNEL DEMUX
62
84
S-VIDEO
NTSC
TV RF
AUDIO
OUTPUT DRIVERS
NTSC ENCODER
82
VIDEO DECODER & OSD
78
DECRYPTION
64
66
AUDEO SUBSYSTEM
80
AUDEO DECODER
76
ACCESS CARD INTERFACE
ACCESS CARD READER
68
µp
CK
TRANSPORT
LOCAL BUS
PSTN
TELCO MODEM
86
MICROPROCESSOR
58
SYSTEM RAM
70
27MHzCLOCK CK
92
FRONT PANEL
88
POWER SUPPLY
90

FIG. 6

Simplified Control Signal	Simplified DISEqC Control Signal	Multi-switch (if present) Input Port Number Connected to Output Port	Non-stacked LNB Option 1 (Figure 2)	Non-stacked LNB Option 1 (Figure 3)	Non-stacked LNB Option 1 (Figure 3)	Non-stacked LNB Option 1 (Figure 4)	Non-stacked LNB Option 1 (Figure 4)	Stacked LNB Option 2 (Figure 5)	
+13 V	+13V & addr= 0001 + cmd= 0x02	1	Network 0 RHCP	Network 0 RHCP	Network 0 RHCP	Network 0 RHCP	Network 0 RHCP	Network 0 RHCP & LHCP	
+18 V	+18V & addr= 0001 + cmd= 0x02	2	Network 0 LHCP	Network 0 LHCP	Network 0 LHCP	Network 0 LHCP	Network 0 LHCP	Network 3 RHCP & Network 2&3LHCP	
+13 V & 22KHz	+13V & addr= 0001 + cmd= 0x03	3	Not used	Network 1 VP	Network 3 RHCP	Network 3 RHCP	Network 3 RHCP	For future use	4 input multi-switch
+18 V & 22KHz	+18V & addr= 0001 + cmd= 0x03	4	Not used	Network 1 HP	Network 3 LHCP	Network 2&3 LHCP	Network 2&3 LHCP	For future use	
Not used	+13V & addr= 0001 + cmd= 0x04	5	Not used	Not used	Not used	Not used	For future use	For future use	8 input multi-switch
Not used	+18V & addr= 0001 + cmd= 0x04	6	Not used	Not used	Not used	Not used	For future use	For future use	
Not used	+13V & addr= 0001 + cmd= 0x05	7	Not used	Not used	Not used	Not used	For future use	For future use	
Not used	+18V & addr= 0001 + cmd= 0x05	8	Not used	Not used	Not used	Not used	For future use	For future use	

FIG. 7

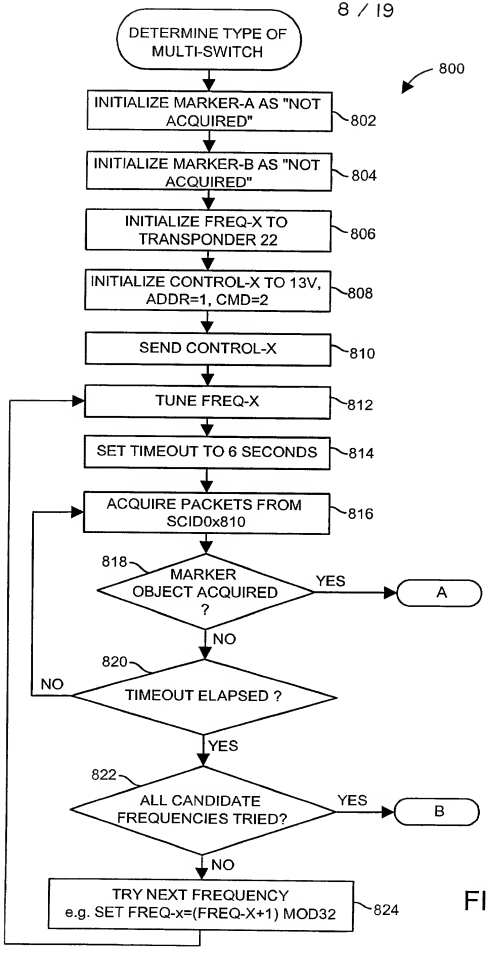
DETERMINE TYPE OF MULTI-SWITCH
800
INITIALIZE MARKER-A AS "NOT ACQUIRED"
802
INITIALIZE MARKER-B AS "NOT ACQUIRED"
804
INITIALIZE FREQ-X TO TRANSPONDER 22
806
INITIALIZE CONTROL-X TO 13V, ADDR=1, CMD=2
808
SEND CONTROL-X
810
TUNE FREQ-X
812
SET TIMEOUT TO 6 SECONDS
814
ACQUIRE PACKETS FROM SCID0x810
816
818
MARKER OBJECT ACQUIRED ?
YES
A
NO
820
NO
TIMEOUT ELAPSED ?
YES
822
ALL CANDIDATE FREQUENCIES TRIED?
YES
B
NO
TRY NEXT FREQUENCY e.g. SET FREQ-x=(FREQ-X+1) MOD32
824

FIG. 8

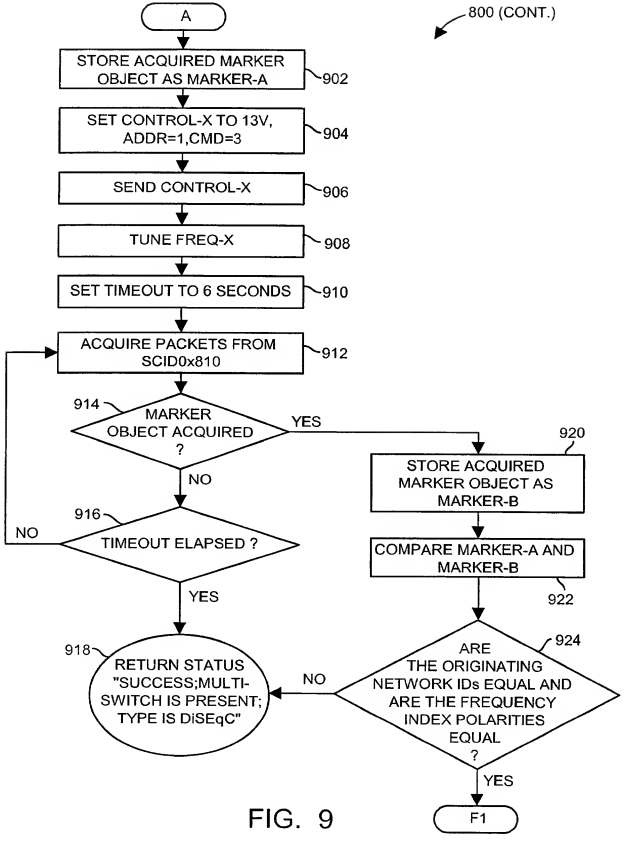
A
800 (CONT.)
STORE ACQUIRED MARKER OBJECT AS MARKER-A
902
SET CONTROL-X TO 13V, ADDR=1,CMD=3
904
SEND CONTROL-X
906
TUNE FREQ-X
908
SET TIMEOUT TO 6 SECONDS
910
ACQUIRE PACKETS FROM SCID0x810
912
914
MARKER OBJECT ACQUIRED ?
YES
NO
920
STORE ACQUIRED MARKER OBJECT AS MARKER-B
916
NO
TIMEOUT ELAPSED ?
COMPARE MARKER-A AND MARKER-B
YES
922
924
ARE THE ORIGINATING NETWORK IDs EQUAL AND ARE THE FREQUENCY INDEX POLARITIES EQUAL ?
918
RETURN STATUS "SUCCESS;MULTI-SWITCH IS PRESENT; TYPE IS DiSEqC"
NO
YES
F1

FIG. 9

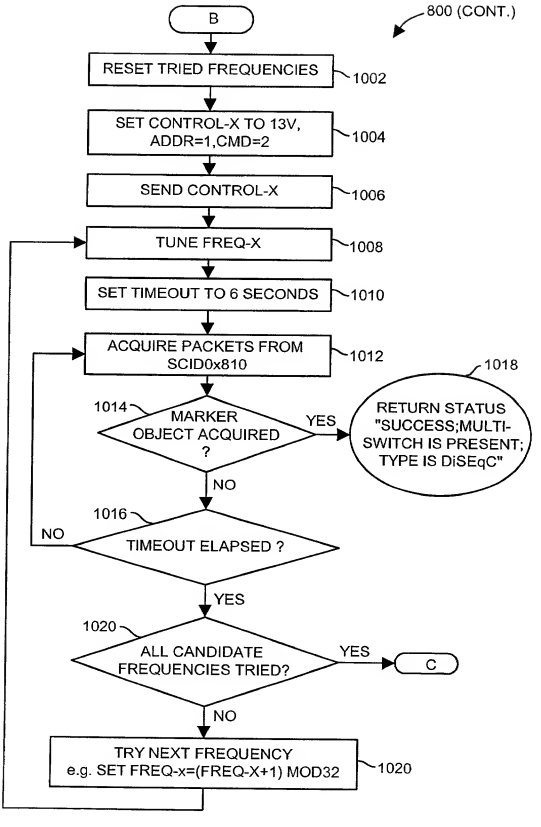
B
800 (CONT.)
RESET TRIED FREQUENCIES
1002
SET CONTROL-X TO 13V, ADDR=1,CMD=2
1004
SEND CONTROL-X
1006
TUNE FREQ-X
1008
SET TIMEOUT TO 6 SECONDS
1010
ACQUIRE PACKETS FROM SCID0x810
1012
1014
MARKER OBJECT ACQUIRED ?
YES
1018
RETURN STATUS "SUCCESS;MULTI-SWITCH IS PRESENT; TYPE IS DiSEqC"
NO
1016
NO
TIMEOUT ELAPSED ?
YES
1020
ALL CANDIDATE FREQUENCIES TRIED?
YES
C
NO
TRY NEXT FREQUENCY e.g. SET FREQ-x=(FREQ-X+1) MOD32
1020

FIG. 10

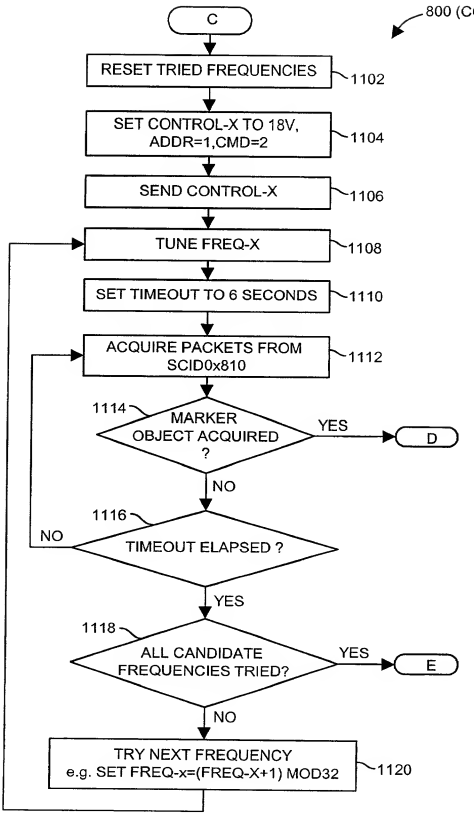
800 (CONT.)
C
RESET TRIED FREQUENCIES
1102
SET CONTROL-X TO 18V, ADDR=1,CMD=2
1104
SEND CONTROL-X
1106
TUNE FREQ-X
1108
SET TIMEOUT TO 6 SECONDS
1110
ACQUIRE PACKETS FROM SCID0x810
1112
1114
MARKER OBJECT ACQUIRED ?
YES
D
NO
1116
NO
TIMEOUT ELAPSED ?
YES
1118
ALL CANDIDATE FREQUENCIES TRIED?
YES
E
NO
TRY NEXT FREQUENCY e.g. SET FREQ-x=(FREQ-X+1) MOD32
1120

FIG. 11

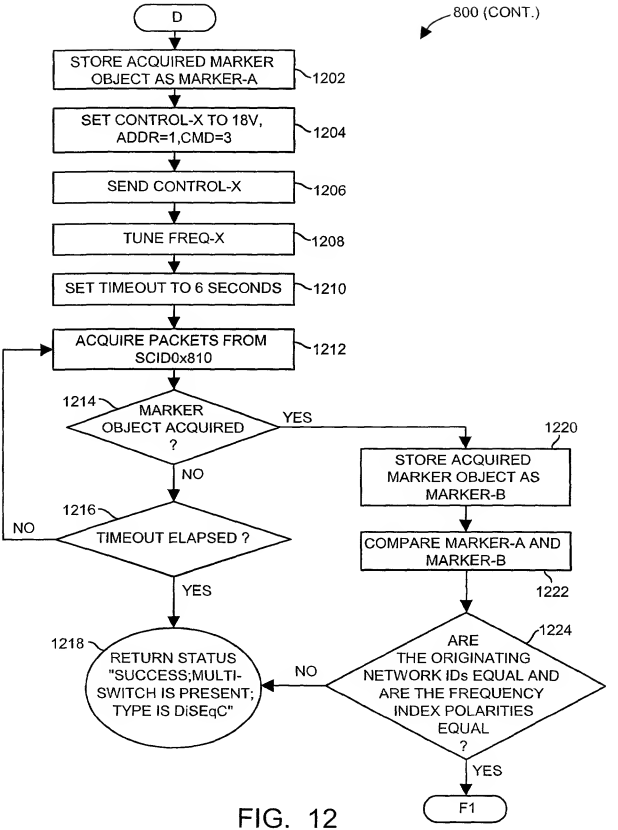
800 (CONT.)
D
STORE ACQUIRED MARKER OBJECT AS MARKER-A
1202
SET CONTROL-X TO 18V, ADDR=1,CMD=3
1204
SEND CONTROL-X
1206
TUNE FREQ-X
1208
SET TIMEOUT TO 6 SECONDS
1210
ACQUIRE PACKETS FROM SCID0x810
1212
1214
MARKER OBJECT ACQUIRED ?
YES
NO
1216
TIMEOUT ELAPSED ?
NO
YES
1218
RETURN STATUS "SUCCESS;MULTI-SWITCH IS PRESENT; TYPE IS DiSEqC"
1220
STORE ACQUIRED MARKER OBJECT AS MARKER-B
COMPARE MARKER-A AND MARKER-B
1222
1224
ARE THE ORIGINATING NETWORK IDs EQUAL AND ARE THE FREQUENCY INDEX POLARITIES EQUAL ?
NO
YES
F1

FIG. 12

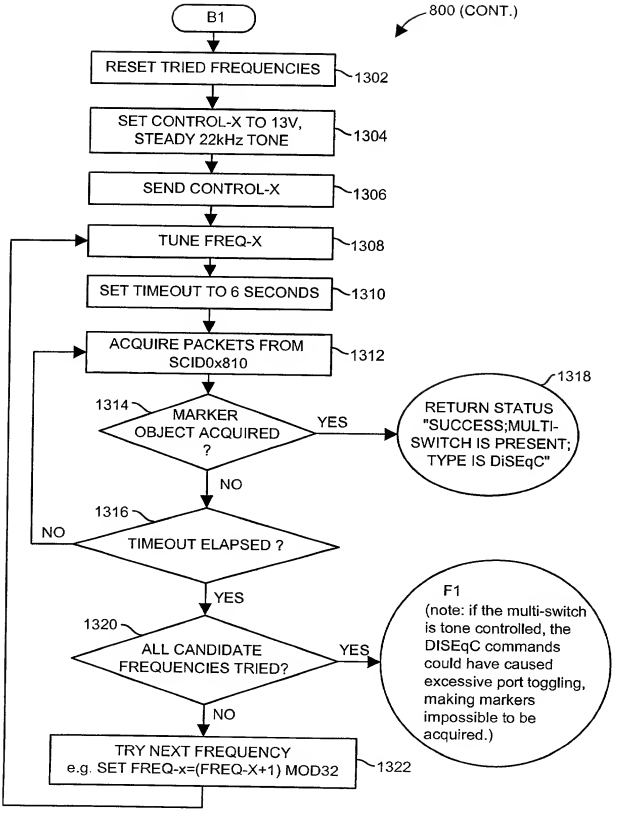
B1
800 (CONT.)
RESET TRIED FREQUENCIES
1302
SET CONTROL-X TO 13V, STEADY 22kHz TONE
1304
SEND CONTROL-X
1306
TUNE FREQ-X
1308
SET TIMEOUT TO 6 SECONDS
1310
ACQUIRE PACKETS FROM SCID0x810
1312
1314
MARKER OBJECT ACQUIRED ?
YES
1318
RETURN STATUS "SUCCESS;MULTI-SWITCH IS PRESENT; TYPE IS DiSEqC"
NO
1316
NO
TIMEOUT ELAPSED ?
YES
1320
ALL CANDIDATE FREQUENCIES TRIED?
YES
F1
(note: if the multi-switch is tone controlled, the DISEqC commands could have caused excessive port toggling, making markers impossible to be acquired.)
NO
TRY NEXT FREQUENCY
e.g. SET FREQ-x=(FREQ-X+1) MOD32
1322

FIG. 13

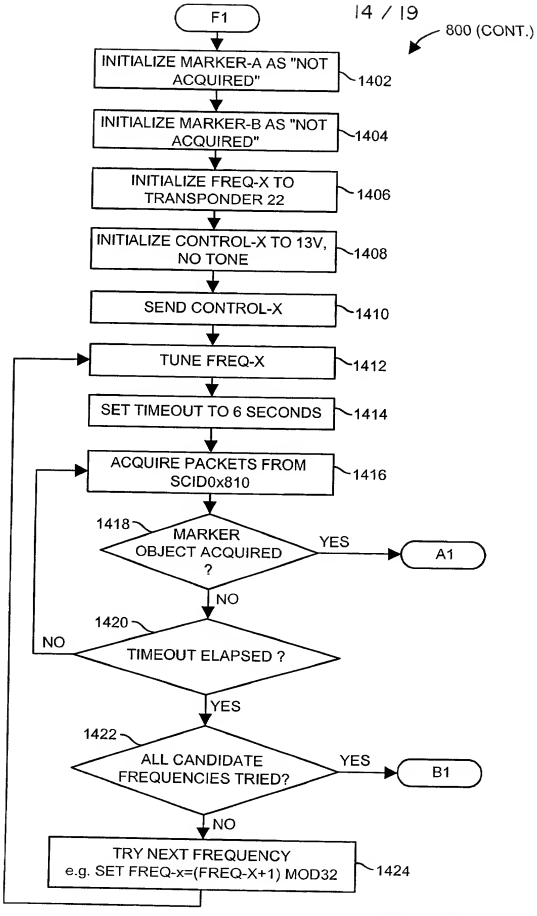
800 (CONT.)
F1
INITIALIZE MARKER-A AS "NOT ACQUIRED"
1402
INITIALIZE MARKER-B AS "NOT ACQUIRED"
1404
INITIALIZE FREQ-X TO TRANSPONDER 22
1406
INITIALIZE CONTROL-X TO 13V, NO TONE
1408
SEND CONTROL-X
1410
TUNE FREQ-X
1412
SET TIMEOUT TO 6 SECONDS
1414
ACQUIRE PACKETS FROM SCID0x810
1416
1418
MARKER OBJECT ACQUIRED ?
YES
A1
NO
1420
NO
TIMEOUT ELAPSED ?
YES
1422
ALL CANDIDATE FREQUENCIES TRIED?
YES
B1
NO
TRY NEXT FREQUENCY
e.g. SET FREQ-x=(FREQ-X+1) MOD32
1424

FIG. 14

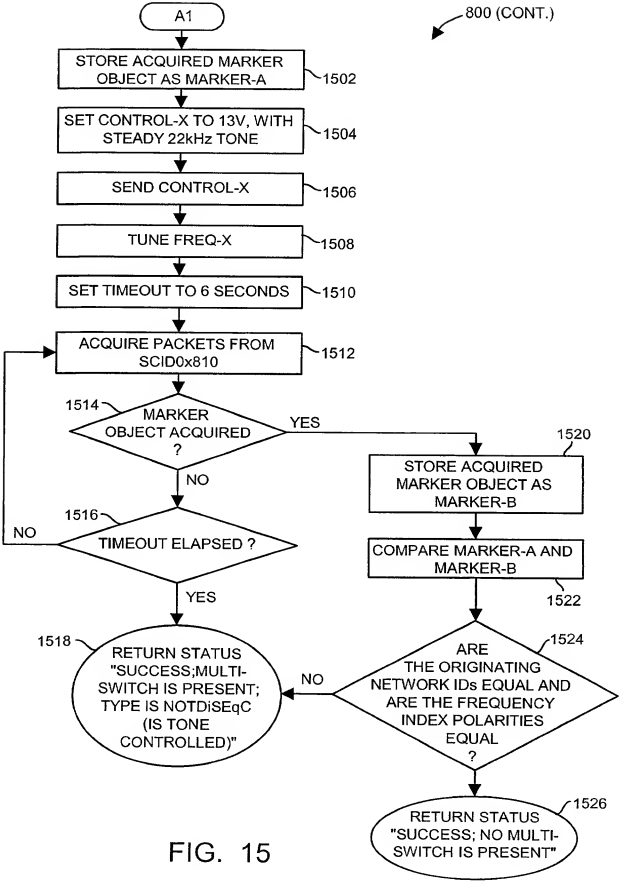
A1
800 (CONT.)
STORE ACQUIRED MARKER OBJECT AS MARKER-A
1502
SET CONTROL-X TO 13V, WITH STEADY 22kHz TONE
1504
SEND CONTROL-X
1506
TUNE FREQ-X
1508
SET TIMEOUT TO 6 SECONDS
1510
ACQUIRE PACKETS FROM SCID0x810
1512
1514
MARKER OBJECT ACQUIRED ?
YES
NO
1520
STORE ACQUIRED MARKER OBJECT AS MARKER-B
1516
NO
TIMEOUT ELAPSED ?
YES
COMPARE MARKER-A AND MARKER-B
1522
1518
RETURN STATUS "SUCCESS;MULTI-SWITCH IS PRESENT; TYPE IS NOTDiSEqC (IS TONE CONTROLLED)"
NO
1524
ARE THE ORIGINATING NETWORK IDs EQUAL AND ARE THE FREQUENCY INDEX POLARITIES EQUAL ?
1526
RETURN STATUS "SUCCESS; NO MULTI-SWITCH IS PRESENT"

FIG. 15

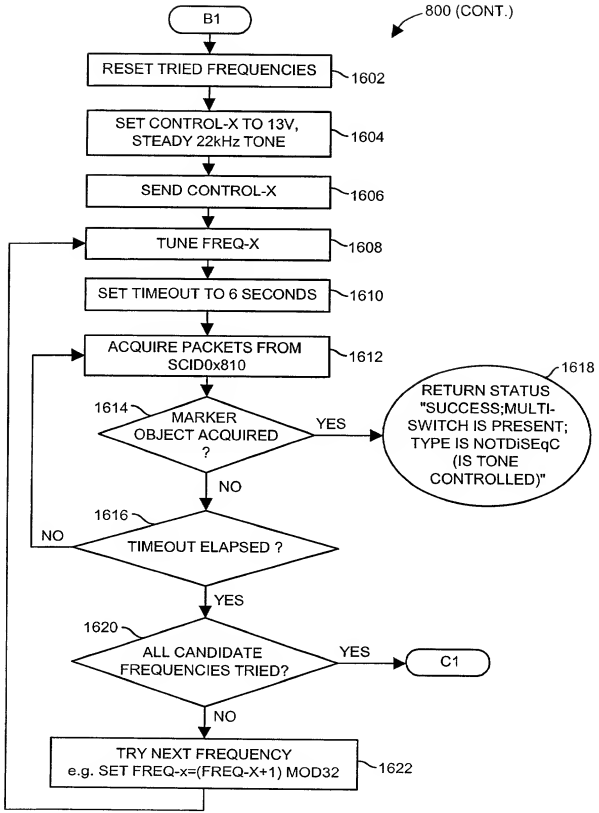
800 (CONT.)
B1
RESET TRIED FREQUENCIES
1602
SET CONTROL-X TO 13V, STEADY 22kHz TONE
1604
SEND CONTROL-X
1606
TUNE FREQ-X
1608
SET TIMEOUT TO 6 SECONDS
1610
ACQUIRE PACKETS FROM SCID0x810
1612
1614
MARKER OBJECT ACQUIRED ?
YES
1618
RETURN STATUS "SUCCESS;MULTI-SWITCH IS PRESENT; TYPE IS NOTDiSEqC (IS TONE CONTROLLED)"
NO
1616
NO
TIMEOUT ELAPSED ?
YES
1620
ALL CANDIDATE FREQUENCIES TRIED?
YES
C1
NO
TRY NEXT FREQUENCY e.g. SET FREQ-x=(FREQ-X+1) MOD32
1622

FIG. 16

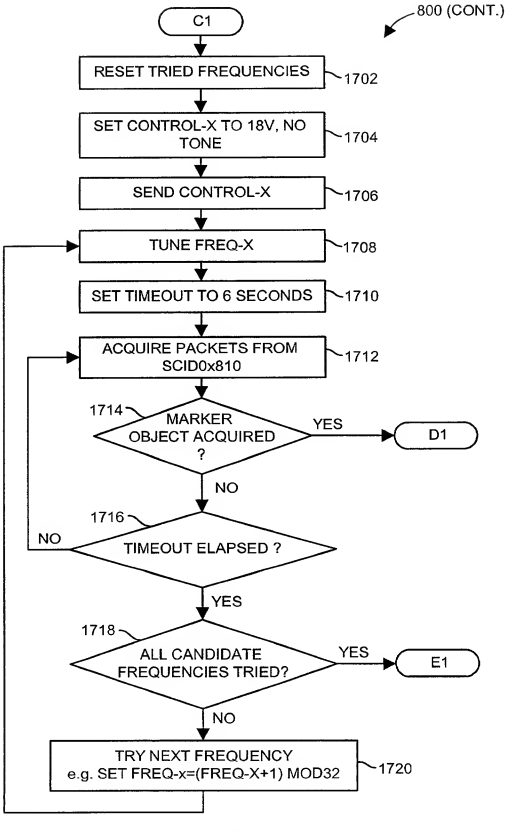
800 (CONT.)
C1
RESET TRIED FREQUENCIES
1702
SET CONTROL-X TO 18V, NO TONE
1704
SEND CONTROL-X
1706
TUNE FREQ-X
1708
SET TIMEOUT TO 6 SECONDS
1710
ACQUIRE PACKETS FROM SCID0x810
1712
1714
MARKER OBJECT ACQUIRED ?
YES
D1
NO
1716
NO
TIMEOUT ELAPSED ?
YES
1718
ALL CANDIDATE FREQUENCIES TRIED?
YES
E1
NO
TRY NEXT FREQUENCY
e.g. SET FREQ-x=(FREQ-X+1) MOD32
1720

FIG. 17

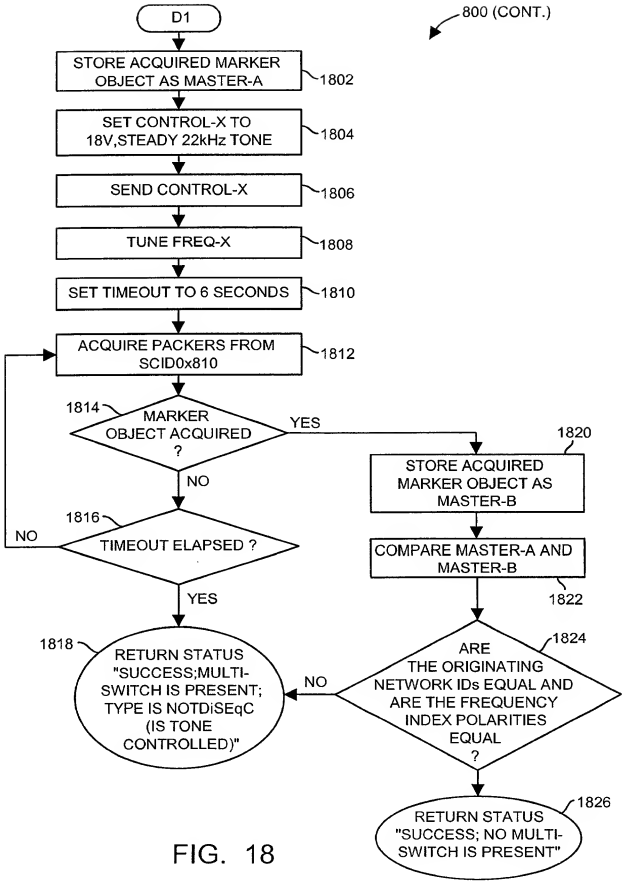
D1
800 (CONT.)
STORE ACQUIRED MARKER OBJECT AS MASTER-A
1802
SET CONTROL-X TO 18V,STEADY 22kHz TONE
1804
SEND CONTROL-X
1806
TUNE FREQ-X
1808
SET TIMEOUT TO 6 SECONDS
1810
ACQUIRE PACKERS FROM SCID0x810
1812
1814
MARKER OBJECT ACQUIRED ?
YES
NO
1820
STORE ACQUIRED MARKER OBJECT AS MASTER-B
1816
NO
TIMEOUT ELAPSED ?
COMPARE MASTER-A AND MASTER-B
YES
1822
1818
RETURN STATUS "SUCCESS;MULTI-SWITCH IS PRESENT; TYPE IS NOTDiSEqC (IS TONE CONTROLLED)"
1824
NO
ARE THE ORIGINATING NETWORK IDs EQUAL AND ARE THE FREQUENCY INDEX POLARITIES EQUAL ?
1826
RETURN STATUS "SUCCESS; NO MULTI-SWITCH IS PRESENT"

FIG. 18

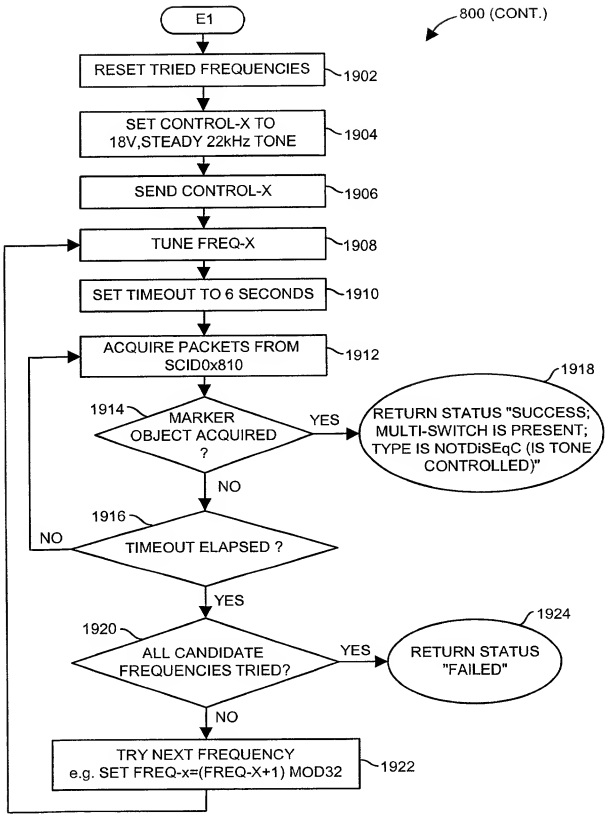
E1
800 (CONT.)
RESET TRIED FREQUENCIES
1902
SET CONTROL-X TO 18V,STEADY 22kHz TONE
1904
SEND CONTROL-X
1906
TUNE FREQ-X
1908
SET TIMEOUT TO 6 SECONDS
1910
ACQUIRE PACKETS FROM SCID0x810
1912
1914
MARKER OBJECT ACQUIRED ?
YES
1918
RETURN STATUS "SUCCESS; MULTI-SWITCH IS PRESENT; TYPE IS NOTDiSEqC (IS TONE CONTROLLED)"
NO
1916
NO
TIMEOUT ELAPSED ?
YES
1920
ALL CANDIDATE FREQUENCIES TRIED?
YES
1924
RETURN STATUS "FAILED"
NO
TRY NEXT FREQUENCY
e.g. SET FREQ-x=(FREQ-X+1) MOD32
1922

FIG. 19